

The following Listing of Claims will replace all prior versions, and listings, of claims in the application.

LISTING OF CLAIMS:

1. (Currently Amended) A method for warm up control of an autonomous inverter-driven hydraulic unit, the autonomous inverter-driven hydraulic unit driving a fixed volume hydraulic pump (3) using a motor (41) controlled by an inverter (40), having a heat radiation device means (6) provided at a predetermined position of a circulation flow path of an oil which is discharged by the fixed volume hydraulic pump (3), the method comprising the steps of

detecting a temperature of the oil flowing along the circulation flow path to obtain a detected oil temperature;

determining judging whether or not the detected oil temperature is equal to or less than a predetermined reference temperature; and

heating-up the heat radiation device means in response to the judgment upon determination that the oil temperature is equal to or less than the predetermined reference temperature.

2. (Currently Amended) The method ~~A method for warm up control of an autonomous inverter driven hydraulic unit~~ as set forth in claim 1, wherein

~~the heat radiation means (6) is a radiator (6), and wherein~~

the heating-up of the heat radiation device means (6)) is carried out by controlling a radiator fan (7) so as to lower ~~the~~ a heat radiation efficiency of ~~the~~ a radiator (6) that is used as the heat radiation device.

3. (Currently Amended) The method ~~A method for warm up control of an autonomous inverter-driven hydraulic unit~~ as set forth in claim 1 ~~or claim 2~~, wherein the detecting ~~detection~~ of an oil the temperature of the oil is carried out by estimating an oil temperature from a ~~revolution~~ rotational speed of the motor (11) when a pressure is controlled.

4. (Currently Amended) The method ~~A method for warm up control of an autonomous inverter-driven hydraulic unit~~ as set forth in claim 1 ~~or claim 2~~, wherein the detecting ~~detection~~ of an oil the temperature of the oil is carried out by estimating an oil temperature from a pressure when a flow rate is controlled.

5. (Currently Amended) The method ~~A method for warm up control of an autonomous inverter-driven hydraulic unit~~ as set forth in claim 2, wherein the controlling of the radiator fan (7) ~~which is carried out~~ for lowering the heat radiation efficiency is carried out by decreasing a rotational speed ~~, is decreasing a revolution~~ of the radiator fan (7) or stopping the radiator fan (7).

6. (Currently Amended) A method for warm up control of an autonomous inverter-driven hydraulic unit, the autonomous inverter-driven hydraulic unit being arranged to drive a fixed volume hydraulic pump (34) using an integral-type motor (33) controlled by an inverter (32), the method comprising the steps of

detecting a temperature of the oil flowing along the circulation flow path to obtain a detected oil temperature;

determining ~~judging~~ whether or not the detected oil temperature is equal to or less than a predetermined reference temperature; and

shifting a current phase from an optimum current phase for increasing heat generation of the motor (33) ~~in response to the judgment result indicating~~ upon determination that the oil temperature is equal to or less than the predetermined reference temperature.

7. (Currently Amended) The method ~~A method for warm up control of an autonomous inverter-driven hydraulic unit~~ as set forth in claim 6, wherein

the motor (33) is a brushless DC motor (33), and

the shifting of the ~~processing for shifting~~ a current phase from ~~an~~ the optimum current phase is carried out by shifting a ~~the~~ current phase in a leading phase side with respect to a speed electromotive force so as to increase a maximum revolution.

8. (Currently Amended) An apparatus for warm up control of an autonomous inverter-driven hydraulic unit, the autonomous inverter-driven hydraulic unit driving a fixed volume hydraulic pump (3) using a motor (11) controlled by an inverter (10), having a heat radiation device means (6) provided at a predetermined position of a circulation flow path of an oil which is discharged by the fixed volume hydraulic pump (3), the apparatus comprising:

an oil temperature detection device configured and arranged to detect means (15) ~~for detecting~~ a temperature of the oil flowing along the circulation flow path to obtain a detected oil temperature;

a temperature determining section configured and arranged to determine judgment means (15) for judging whether or not the detected oil temperature is equal to or less than a predetermined reference temperature; and

a warm up device configured and arranged to heat means (16) for heating-up the heat radiation device means (6) in response a determination to the judgment by the judgment temperature determining section means (15) that the oil temperature is equal to or less than the predetermined reference temperature.

9. (Currently Amended) The An apparatus for warm-up control of an autonomous inverter driven hydraulic unit as set forth in claim 8, wherein

the heat radiation device includes means (6) is a radiator (6),

the warm up device includes means (16) is a radiator fan controlling device means (16) for controlling configured and arranged to control a radiator fan (7), and

~~wherein~~ the radiator fan (7) is configured and arranged controlled so as to lower a the heat radiation efficiency of the radiator (6) in response to the ~~judgment result~~ determination obtained by the ~~judgment~~ temperature determining device means (15) indicating that the oil temperature is equal to or less than the predetermined reference temperature.

10. (Currently Amended) The An apparatus for warm-up control of an autonomous inverter driven hydraulic unit as set forth in claim 8 ~~or claim 9~~, wherein

the oil temperature detection device is configured and arranged to carry means (15) carries out the detection of ~~an~~ the oil temperature by estimating an oil temperature from a ~~revolution~~ rotational speed of the motor (11) when a pressure is controlled.

11. (Currently Amended) ~~The An~~ apparatus for warm up control of an autonomous inverter-driven hydraulic unit as set forth in claim 8 ~~or claim 9~~, wherein the oil temperature detection device is configured and arranged to carry means (15) carries out the detection of an oil temperature by estimating an oil temperature from a pressure when a flow rate is controlled.

12. (Currently Amended) ~~The An~~ apparatus for warm up control of an autonomous inverter-driven hydraulic unit as set forth in claim 9, wherein the radiator fan controlling device is configured and arranged to means (16) decreases a ~~revolution~~ rotational speed of the radiator fan (7) or stops the radiator fan (7) for lowering the heat radiation efficiency.

13. (Currently Amended) An apparatus for warm up control of an autonomous inverter-driven hydraulic unit, the autonomous inverter-driven hydraulic unit being arranged to drive a fixed volume hydraulic pump (34) using an integral-type motor (33) controlled by an inverter (32), the apparatus comprising:

an oil temperature detection device configured and arranged to detect means (44) for ~~detecting~~ a temperature of the oil flowing along a circulation flow path;

a ~~judgment~~ temperature determining section configured and arranged to determine means (44) for ~~judging~~ whether or not the detected oil temperature is equal to or less than a predetermined reference temperature; and

a current phase controlling device configured and arranged to shift means (39) for ~~shifting~~ a current phase from an optimum current phase for increasing heat generation of the motor (33) in response to ~~the judgment result~~ a determination of the ~~judgment~~ temperature determining section indicating that the oil temperature is equal to or less than the predetermined reference temperature.

14. (Currently Amended) ~~The An~~ apparatus for warm up control of an ~~autonomous inverter driven hydraulic unit~~ as set forth in claim 13, wherein
the motor (33) is a brushless DC motor (33), and ~~wherein~~
the current phase controlling device configured and arranged to shift means (39) ~~carries out~~ ~~the processing for shifting~~ a current phase from an optimum current phase by shifting a current phase in a leading phase side with respect to a speed electromotive force so as to increase a maximum ~~revolution~~ rotational speed.

15. (Currently Amended) The method as set forth in claim 2, wherein
the detecting of the temperature of the oil is carried out by estimating an oil temperature from a rotational speed of the motor when a pressure is controlled.

16. (Currently Amended) The method as set forth in claim 2, wherein
the detecting of the temperature of the oil is carried out by estimating an oil temperature from a pressure when a flow rate is controlled.

17. (Currently Amended) The apparatus as set forth in claim 9, wherein

the oil temperature detection device is configured and arranged to carry out detection of the oil temperature by estimating an oil temperature from a rotational speed of the motor when a pressure is controlled.

18. (Currently Amended) The apparatus as set forth in claim 9, wherein the oil temperature detection device is configured and arranged to carry out the detection of an oil temperature by estimating an oil temperature from a pressure when a flow rate is controlled.